Town of Warsaw Low Impact Development Planning Project

The Low Impact Development Center, Inc.

Balancing Growth and Environmental Integrity

CBLAD 2002

Friends of the Rappahannock

Advocacy • Restoration • Education

Chesapeake Bay Program Small Watersheds Grant Administered By National Fish and Wildlife Foundation

Components of Stormwater Management - Chapter 2

•2-1 Components of Stormwater Management

- *The goal of stormwater management is to mitigate the impact on the hydrologic cycle resulting from changes to the land surface.*

•Low Impact Development

- An eco-system based stormwater management approach designed to maintain the functions of the pre-development hydrololgic cycle or create a "customized" watershed management strategy

Virginia Stormwater Management Program: 1-2

- **Water Quality:** Consistency between Stormwater Management Regulations (DCR), Chesapeake Bay Preservation Act- CBPA (CBLAD), and Virginia Pollution Discharge Elimination System (DEQ)
- **Stream Channel Erosion:** Protect downstream channels from erosion due to increase in volume, velocity, and peak flow rate

Flexible Adoption

- A locality may adopt individual components for local implementation. "Cafeteria Style".
- Local programs must, at a minimum, contain the flooding component.

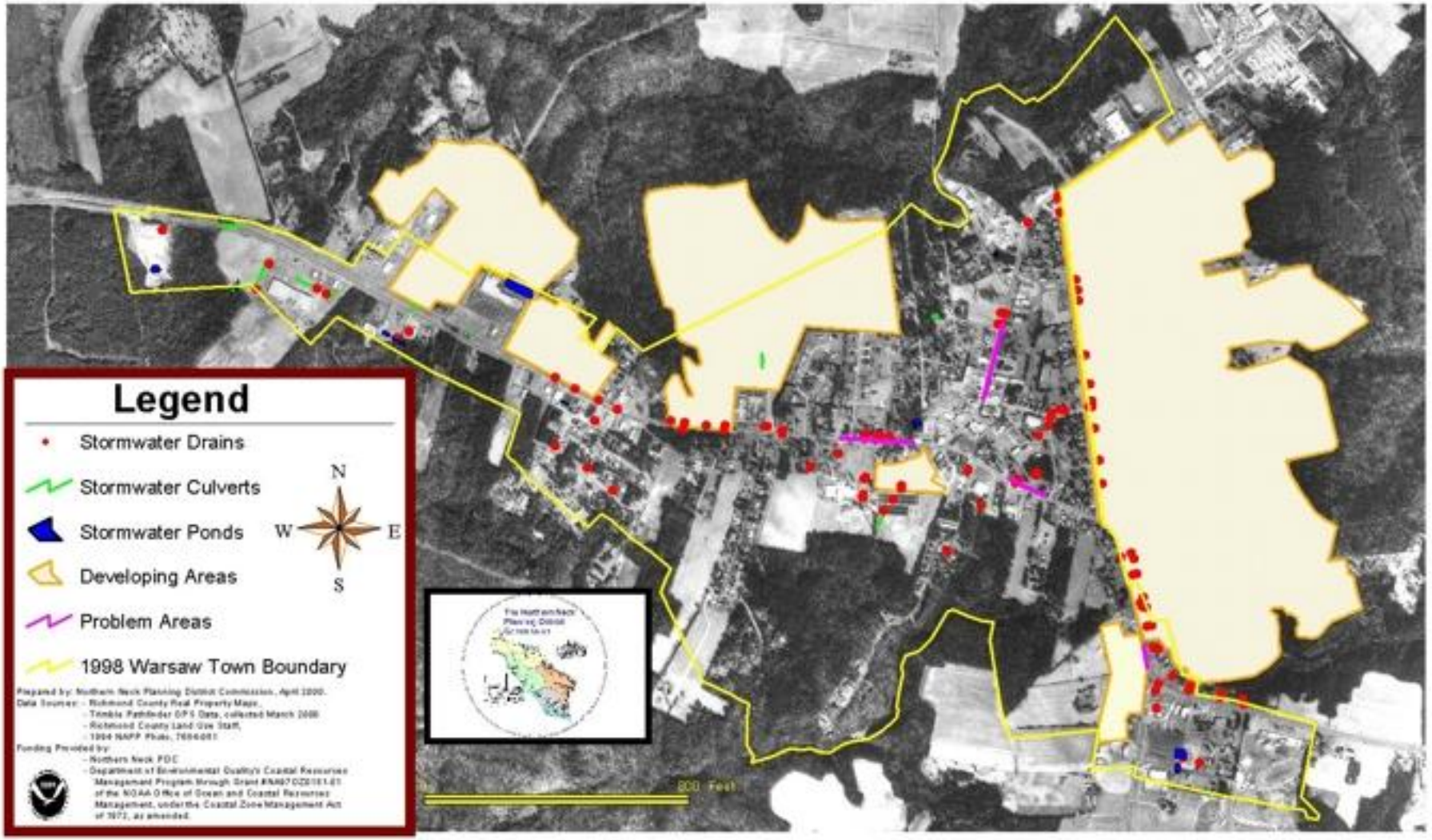
1-2 continued

Part II
Technical Criteria

- 4 VAC 3-20-60 General
- B. NRCS Technology/Rational
- C. Existing Land Good Condition
- F. Pre-development and post-development shall be verified with good engineering practices
- I. All facilities should have a maintenance
- K. Natural channel characteristics shall be preserved to the maximum extent practicable

- LID Criteria
- Design Charts are NRCS TR-55 calculations shown as nomographs that compare volume and peak rates for pre and post-development.
- Model ordinances, covenants, and guidance have been developed for LID maintenance.
- One of the LID options is to have a “customized” design storm that is based on natural stream relationships between channels and floodplains.

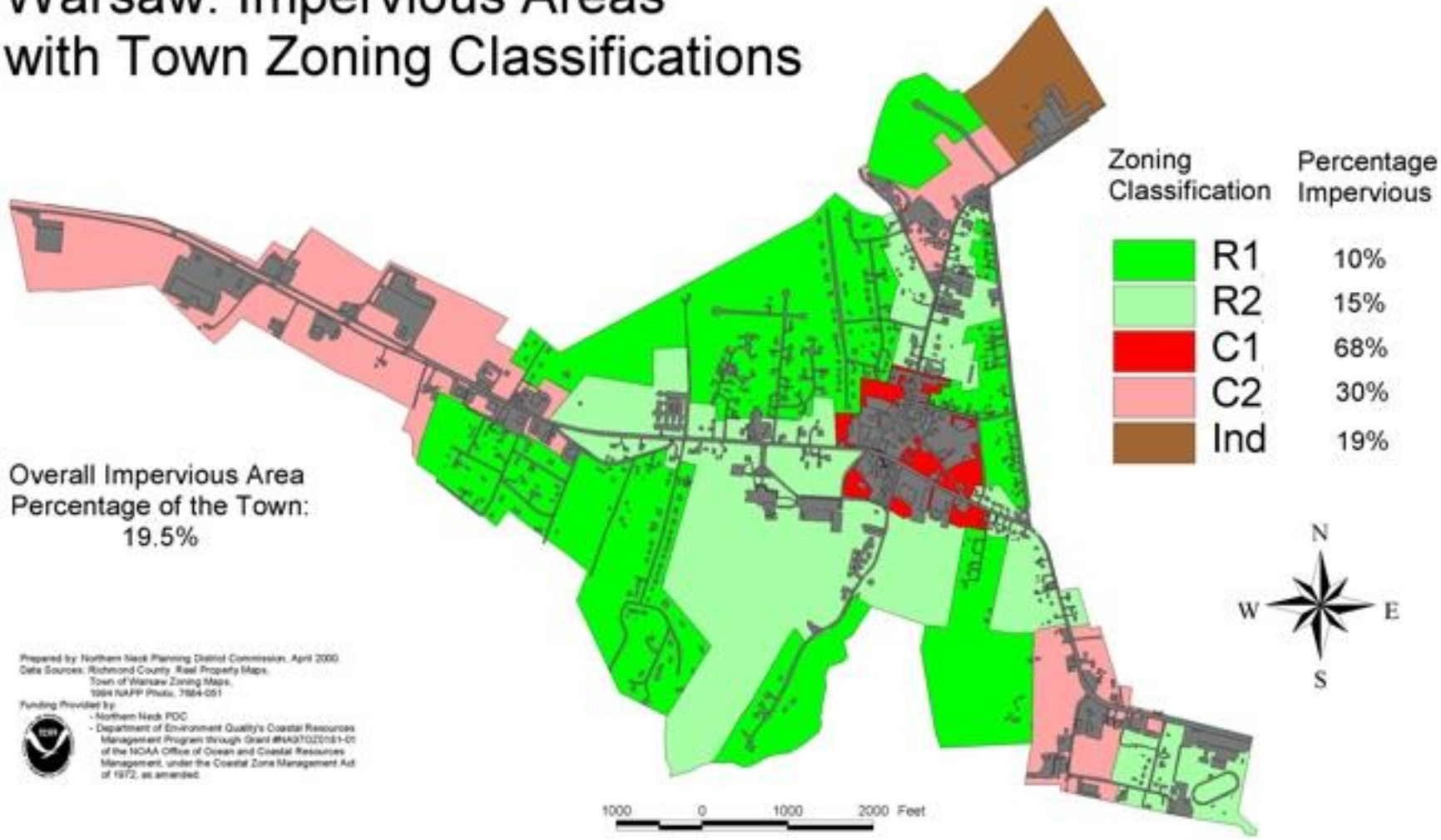
Warsaw: Stormwater Infrastructure, Developing Areas and Problem Areas




WARSAW


AMERICAN GENERAL
FINANCE
NNW
AUTO SUPPLY

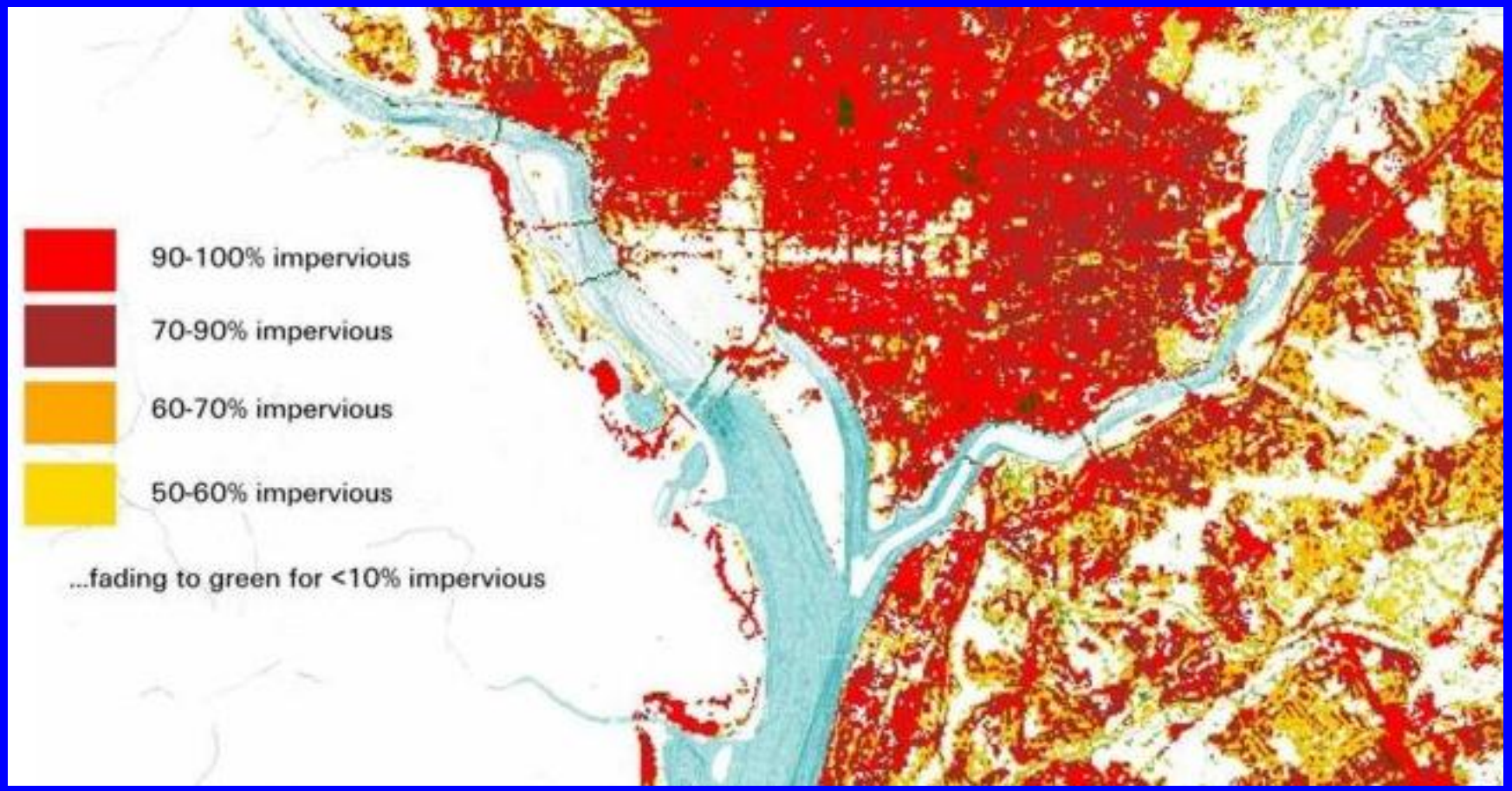
Warsaw: Impervious Areas with Town Zoning Classifications



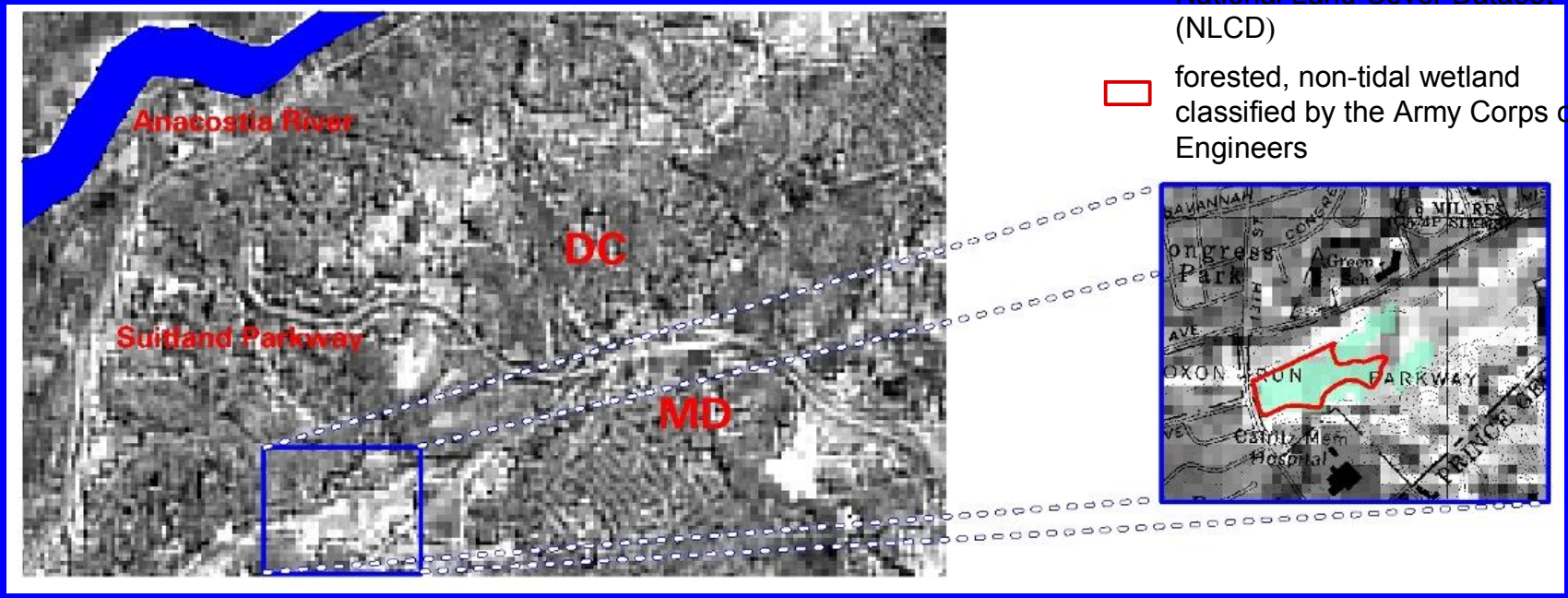
Prepared by: Northern Neck Planning District Commission, April 2000
Data Sources: Richmond County Real Property Maps,
Town of Warsaw Zoning Maps,
1998 NAPP Photo: 7884-051

Funding Provided by:
- Northern Neck PDC
- Department of Environment Quality's Coastal Resources Management Program through Grant #NA97OZ0181-01 of the NOAA Office of Ocean and Coastal Resources Management, under the Coastal Zone Management Act of 1972, as amended.

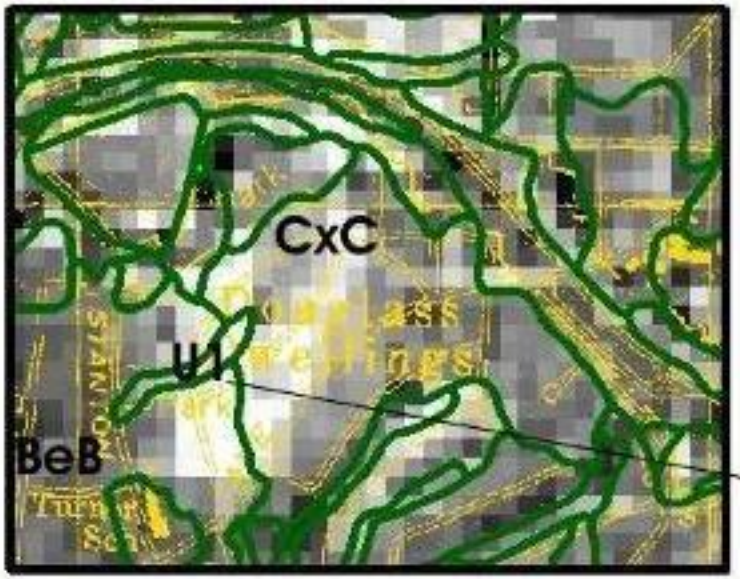
An estimate of imperviousness can be derived directly from the satellite image for developed areas.



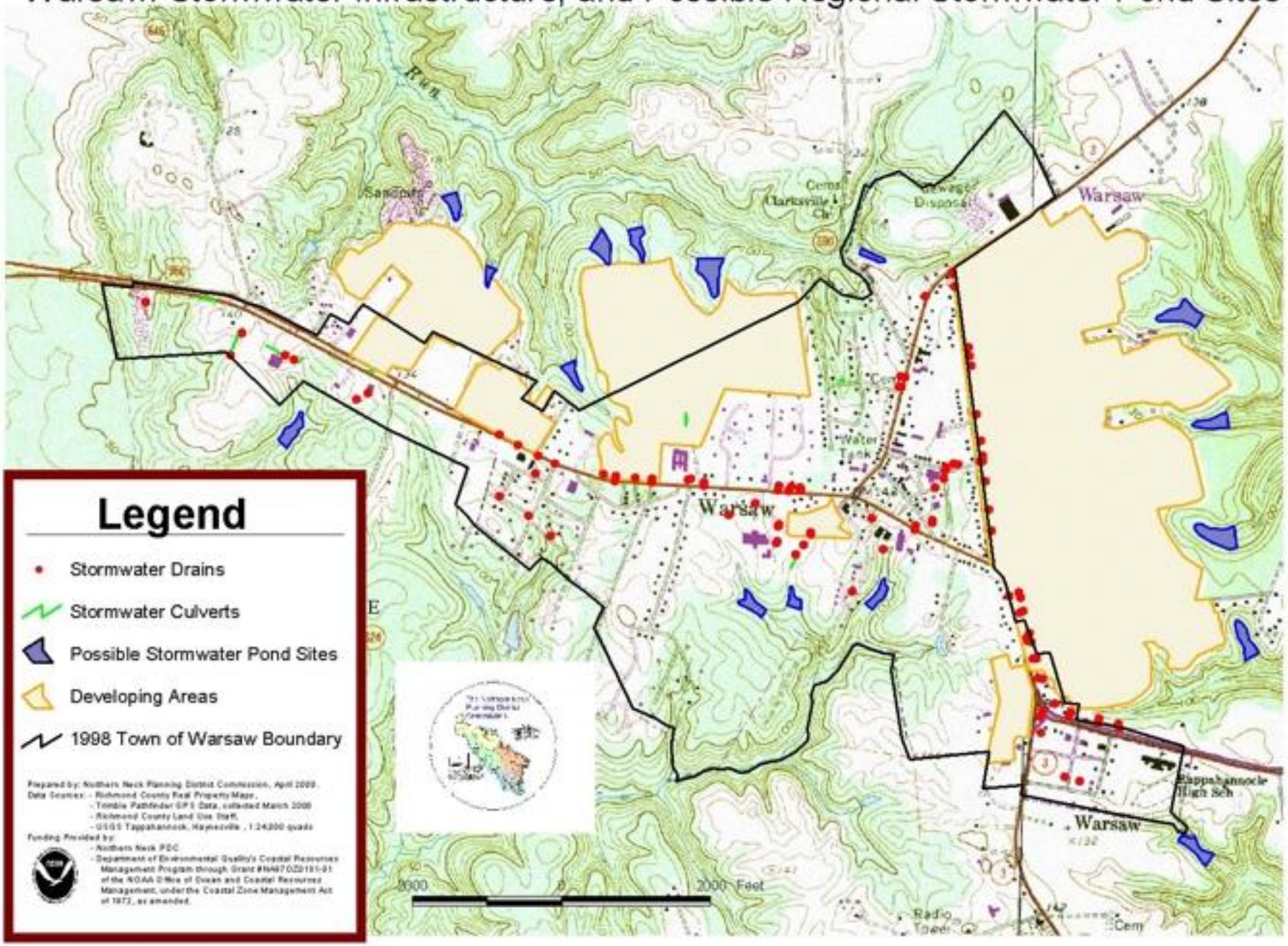
Soil moisture maps can be generated using vegetation and surface temperature data derived from the Landsat image in conjunction with a surface climate model. The gray-scale image is dark for surfaces with a dried out top layer and bright or white for surfaces that are wet. This information can be used to identify dry, compacted soils that no longer function in the capacity of their original Soil Survey classification or to locate areas with very moist surface layers near identified wetlands that can be easily converted to wetlands themselves.



CxC: Croom-Urban land complex, U1: Udorthents, BeB: Beltsville-Urban land complex
This distinctly moist area in the satellite-derived soil moisture map overlaps at least three Soil Survey polygons in the B and C Hydrologic Soil Groups (moderate to low infiltration rates). The tearing down of buildings and grading that must have been occurring when the satellite image was taken dominated the soil moisture signal of this area. Current soil moisture maps can be useful in identifying where land transitions are occurring. The photograph shows the condition of the site during the January visit.



Warsaw: Stormwater Infrastructure, and Possible Regional Stormwater Pond Sites



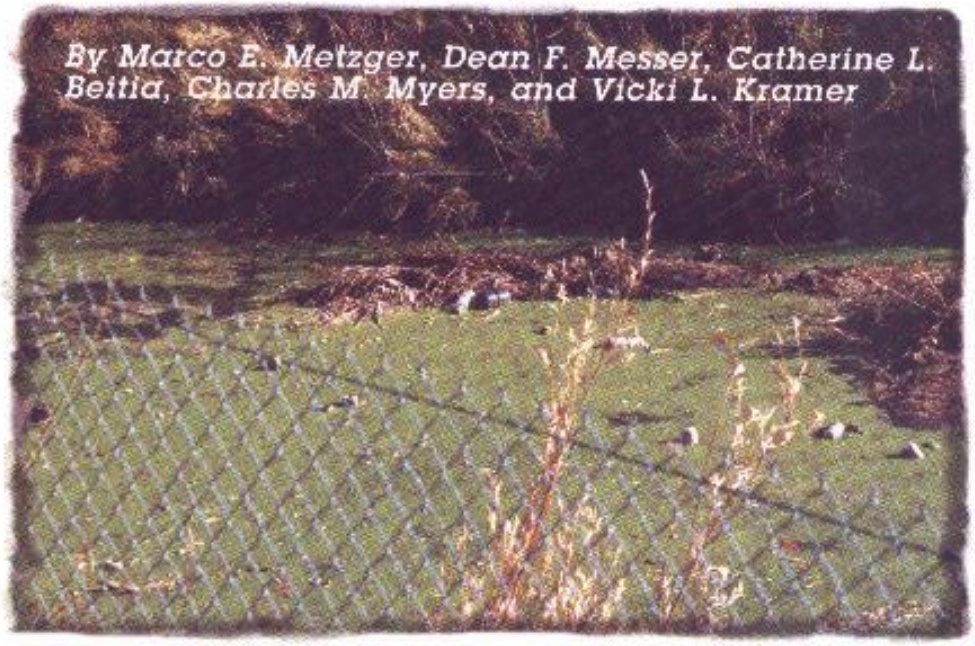
Conventional Urban Pond

Creating Blackholes of Infrastructure

- Space
- Cost
- Inefficiency
- Pollution
- Maintenance
- Safety

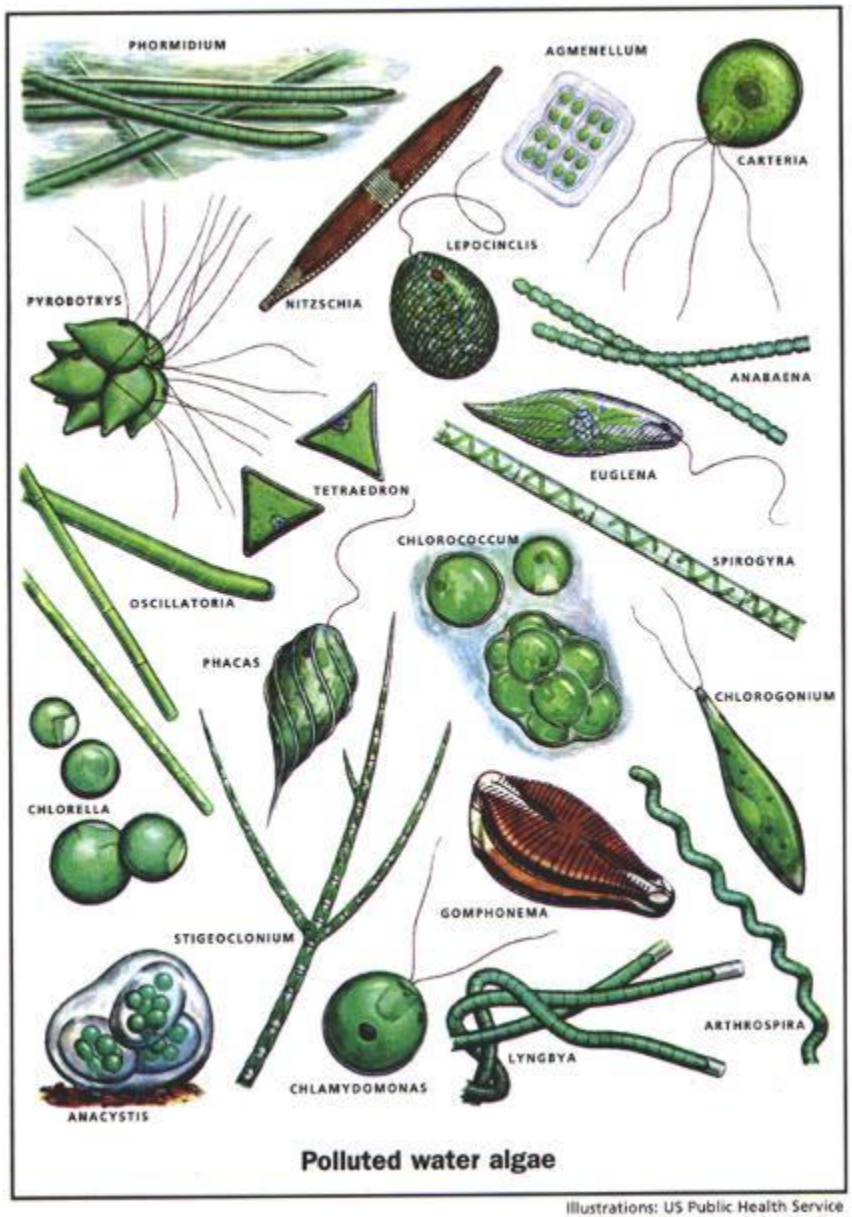
The Dark Side of Stormwater Runoff Management: Disease Vectors Associated With Structural BMPs

By Marco E. Metzger, Dean F. Messer, Catherine L. Beitia, Charles M. Myers, and Vicki L. Kramer

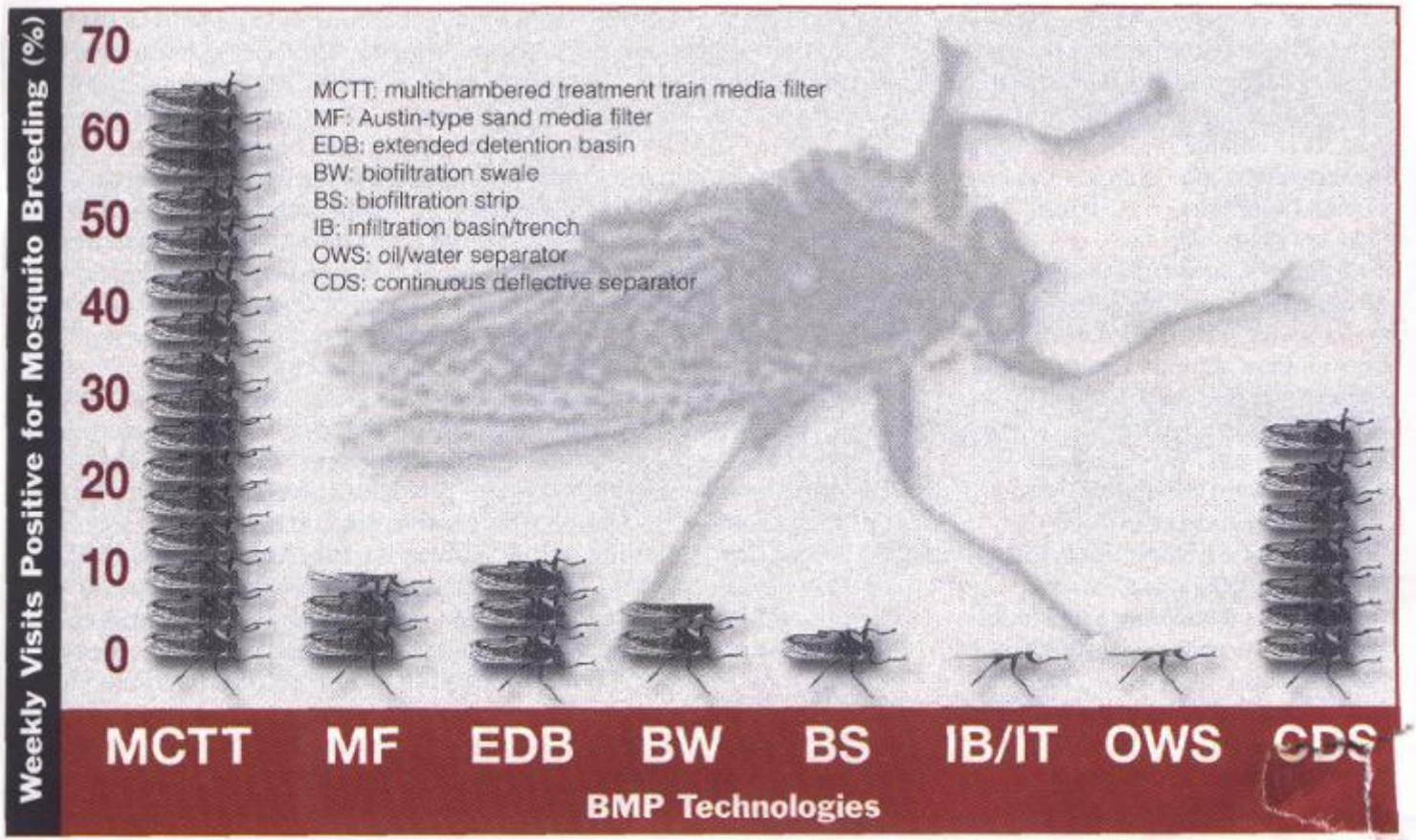


Stormwater Magazine, March 2002


15 11'98



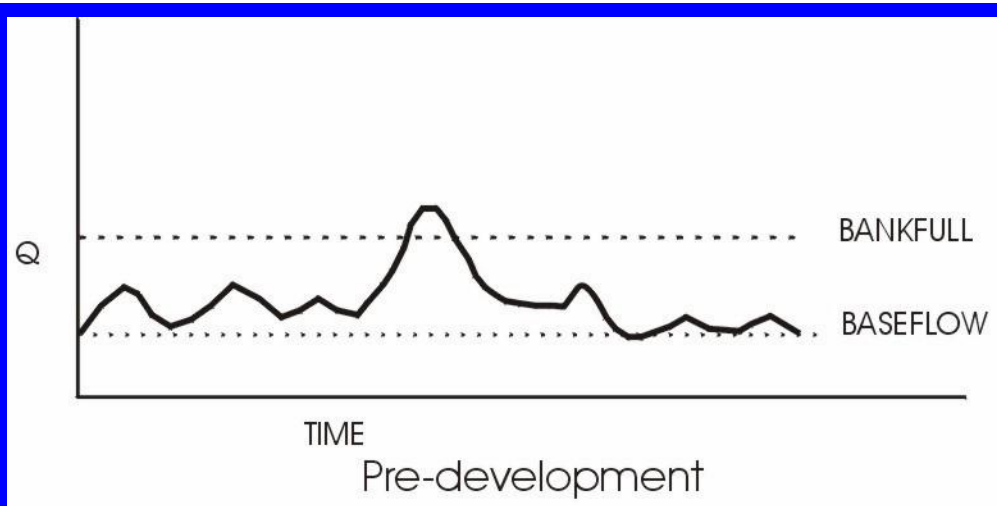
Illustrations: US Public Health Service


Weekly Visits Positive for Mosquito Breeding (%)
70
60
50
40
30
20
10
0
MCTT: multichambered treatment train media filter
MF: Austin-type sand media filter
EDB: extended detention basin
BW: biofiltration swale
BS: biofiltration strip
IB: infiltration basin/trench
OWS: oil/water separator
CDS: continuous deflective separator
MCTT
MF
EDB
BW
BS
IB/IT
OWS
CDS
BMP Technologies

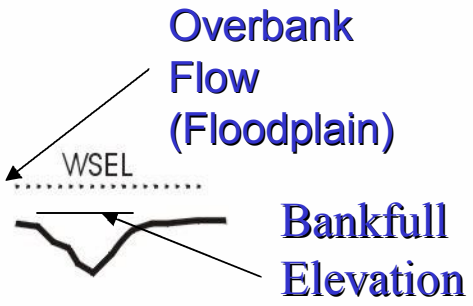

DANGER
NO TRESPASSING
AUTHORIZED
PERSONNEL ONLY
The Management


DANGER
NO TRESPASSING
AUTHORIZED
PERSONNEL ONLY
The Management

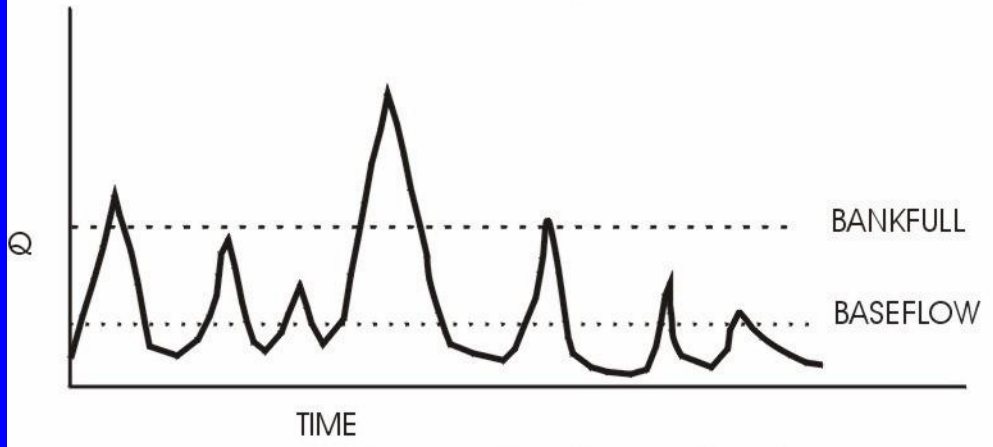
70's Outfall Protection



Pre-development



Cross Section



Urbanization/Agricultural

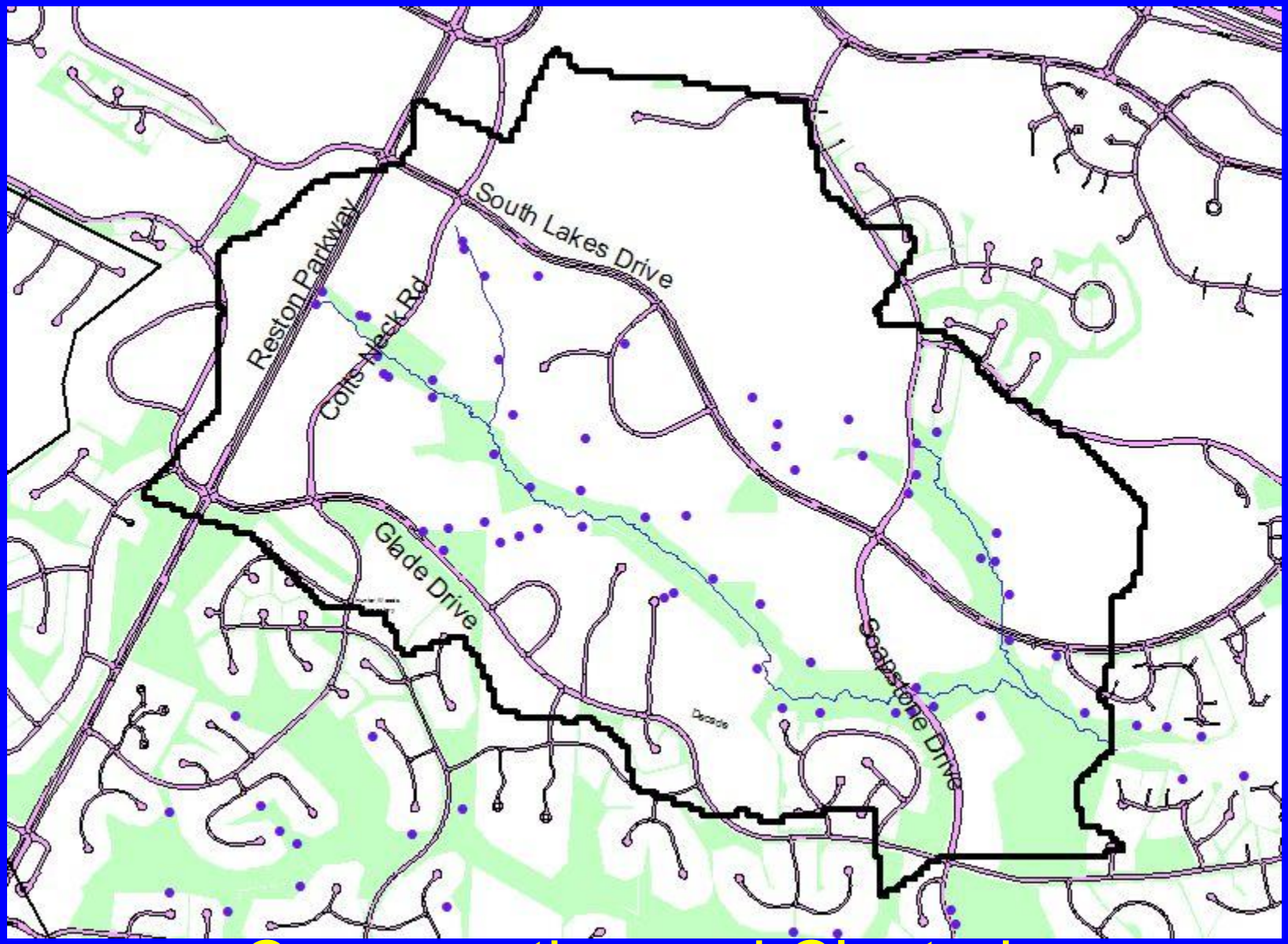
Cross Sections

Stream Response to Development

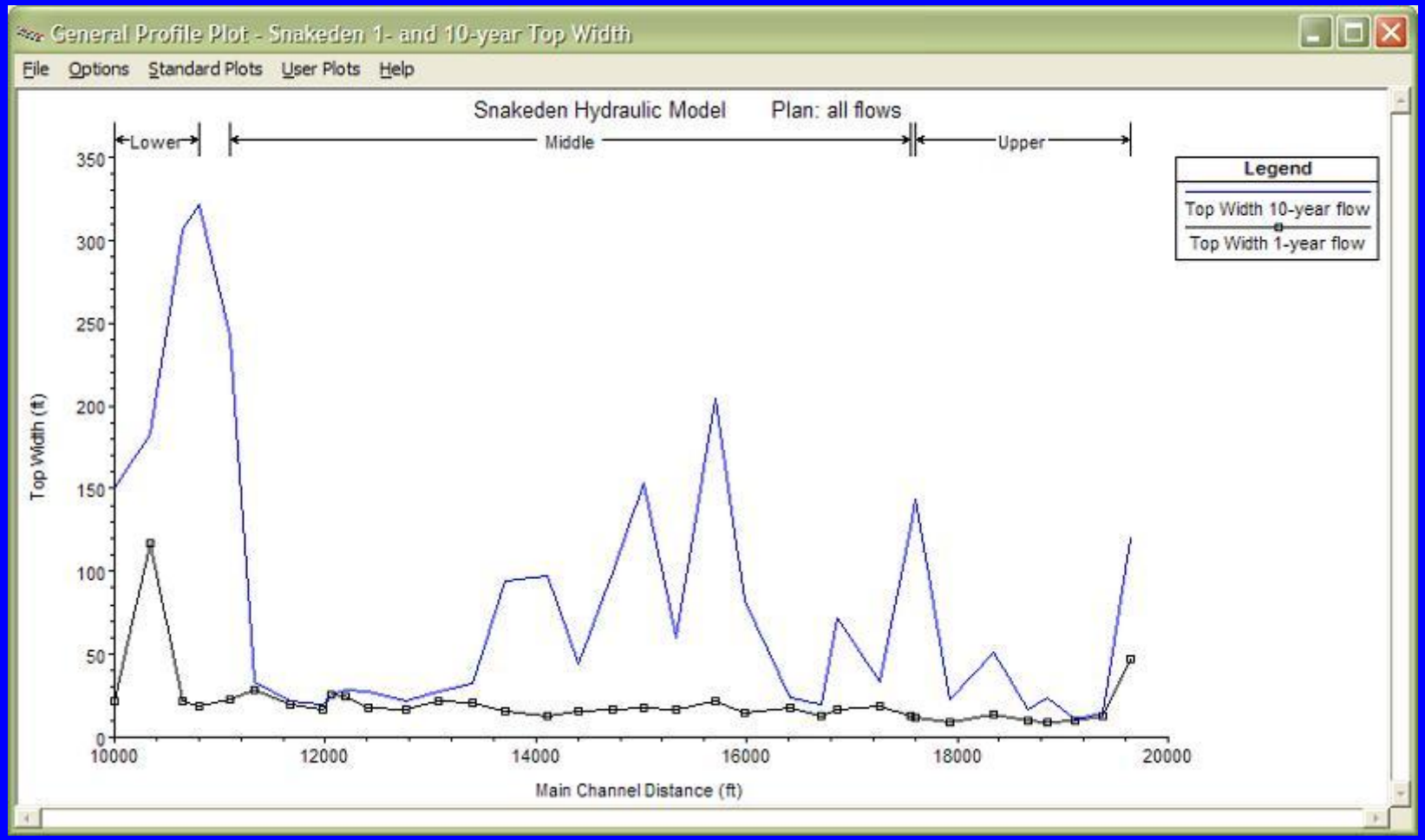
- Incision
- Widening
- Reduction in Baseflow
- Aggradation/Headcutting

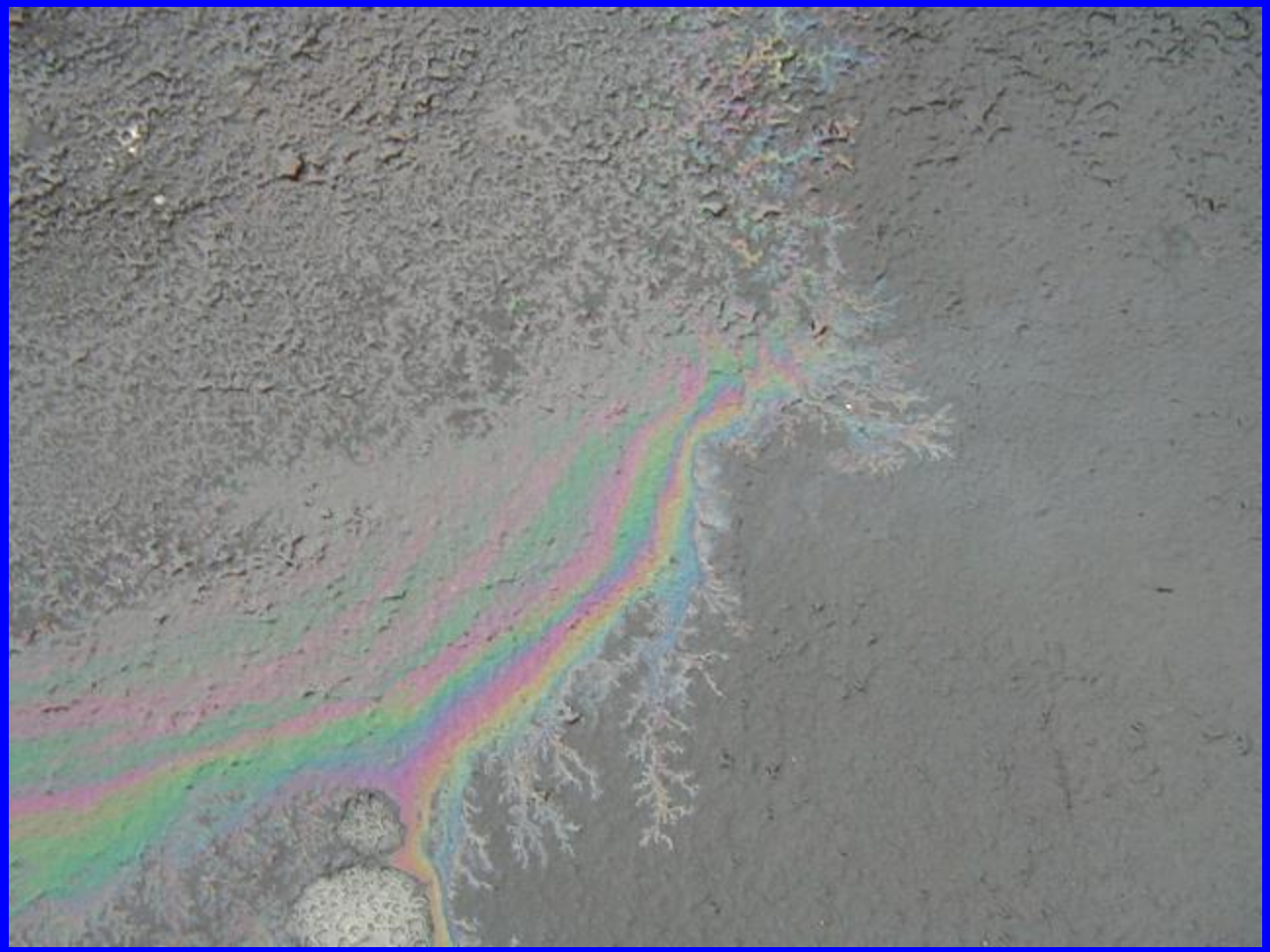
McQuen, 1989

Outfall Locations in Snakeden Watershed



Conservation and Clustering


General Profile Plot - Snakeden 1- and 10-year Top Width
File
Options
Standard Plots
User Plots
Help
Snakeden Hydraulic Model
Plan: all flows
Lower
Middle
Upper
Legend
Top Width 10-year flow
Top Width 1-year flow
Top Width (ft)
0
50
100
150
200
250
300
350
10000
12000
14000
16000
18000
20000
Main Channel Distance (ft)



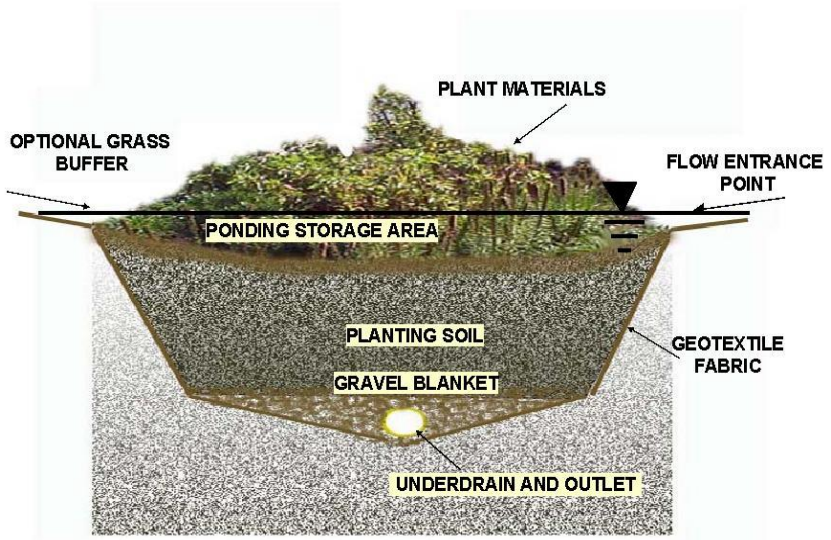

Conventional
Low Impact
Conventional
Functional Landscape Design

1. Conserve Natural Areas

Courtesy CWP

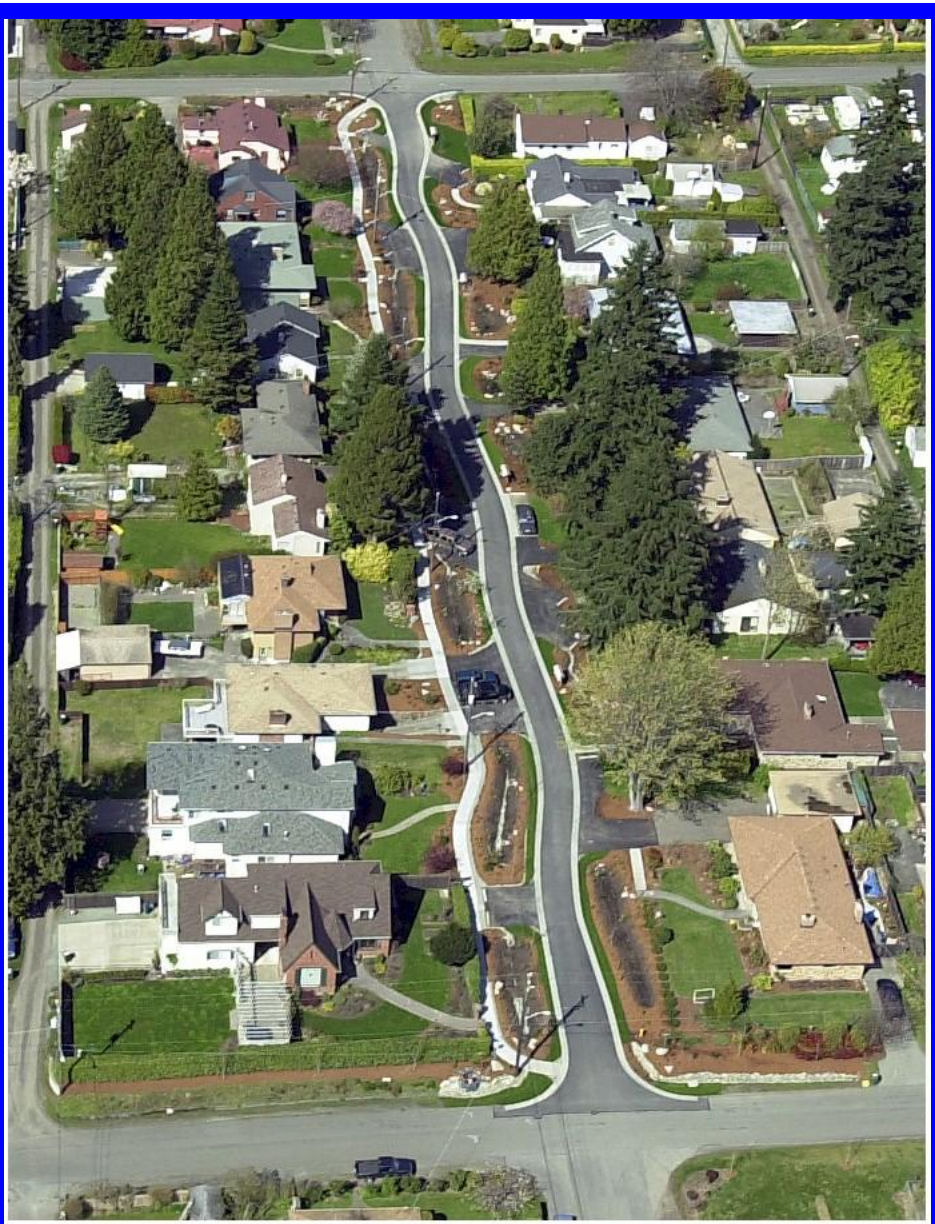
- Conservation of drainages, trees & vegetation
- Land use planning
- Watershed planning
- Habitat conservation plans
- Stream & wetland buffers

Bioretention Cells –20 Future Installations



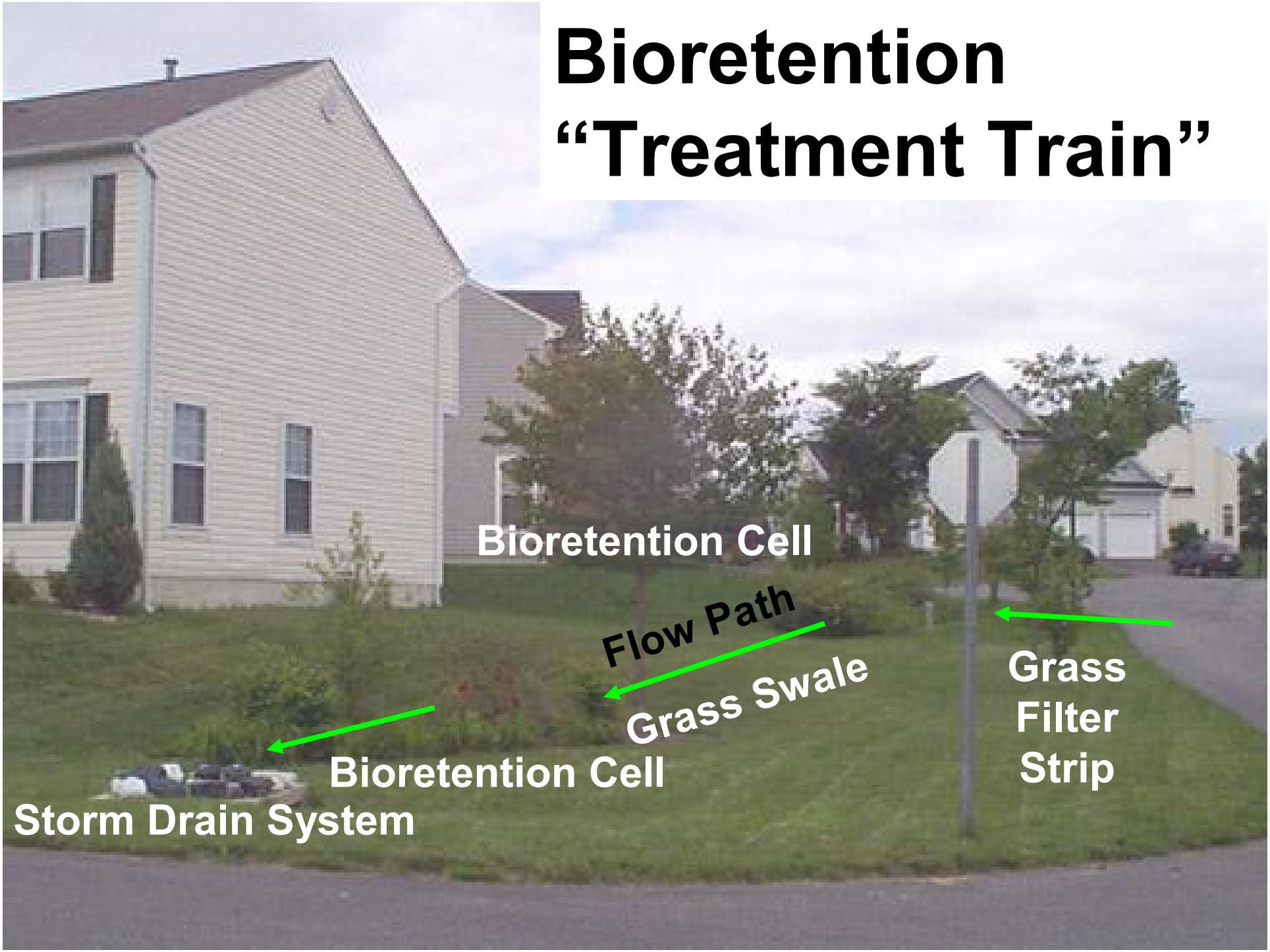
Reduced Impervious Area

- 11% less impervious area than standard street improvement



SEA Streets - After Construction
2nd Ave NW - NW 117th St to NW 120th St

Bioretention "Treatment Train"



Raingardens

Raingardens

Rain barrels


OCT 1 2000

Cascade Station
Street Sand Filters

Important Considerations for Localities

- Innovative or alternative BMP's may be selected upon approval of VDCR. Check VDCR website for new technologies and updates.!!!!
- Other pollutant control may be required by locality: *TMDL's, Local water resource protection objectives (e.g. thermal, TSS)*
- Watershed/Regional based approaches (e.g. street sweeping, pollution prevention) can be used.
- LID allows for any part of the landscape, building, or infrastructure to be modified and designed as a BMP
- LID uses a "customized" management strategy
- P2 and management strategies are a key foundation of LID